STREAMLINE

Microsoft Dynamics™ AX

Implement Best Practices, Gain Insight, and Promote Efficiency with Process Industries for Microsoft Dynamics AX

White Paper

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Microsoft Dynamics

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Introduction

Today's process manufacturers face enormous pressures. In order to remain competitive, these businesses need to convert raw materials efficiently and cost-effectively into final products, while addressing a broad range of regulatory and customer requirements. They must constantly review and evaluate their internal processes to keep their operating costs low while controlling the variability of raw materials at each stage of production. Regulations may change, trading partners and suppliers may be replaced, and raw material quality may improve or degrade, all of which potentially dictate adjustments in formulas or recipes.

Process manufacturers require solutions that combine the planning and reporting capabilities of traditional business management systems with the unique tracking, control, and multi-dimensional inventory requirements of process manufacturing. Using these capabilities they can integrate the entire process manufacturing life cycle and increase the flow of information internally and with customers and trading partners. As a result, process manufacturers can better manage all the variables required to make and deliver high-quality products to custom specifications, gain visibility into production and supply chain activities, optimize capacity, comply with regulatory requirements, and drive continuous process improvement.

Designed specifically for the process manufacturer, Process Industries for Microsoft Dynamics AX, formerly Microsoft® Business Solutions–Axapta®, can help companies increase the speed and efficiency of their manufacturing operations, communicate more effectively with their extended supply chain, and provide real-time information to gain deeper insight into their businesses. This white paper describes the unique requirements of process manufacturers and discusses how Process Industries for Microsoft Dynamics AX can address those needs.

This white paper contains an overview of Process Industries for Microsoft Dynamics AX and a summary of key functions and concepts. Process manufacturing encompasses a wide range of operations. For example, chemical companies often use formulas, while most food and beverage manufacturers use recipes. Likewise, manufacturers in different process industry segments configure products for customers differently. Food, chemical, and pharmaceutical companies tend to use containers and packaging, while basic metals and pulp and paper companies often use variations of end items. For the purposes of this paper, the terms "formula management" and "recipe management" are synonymous.

While the unique characteristics of certain process manufacturing segments may seem important to differentiate, the underlying management and planning techniques used in all segments are similar. A single software solution can address most of the collective set of business requirements. The differences, however, between process and discrete manufacturers are fundamental and cannot be addressed well with a single software solution.

Recipe or Formula Management

Discrete products are assembled from a fixed quantity of components included in a bill of materials and are produced in a relatively linear, predictable manner. On the other hand, process industry products result from a series of mixing operations, chemical reactions, extractions, or other actions that transform raw materials into a final, sellable product. Recipes generally include more variations than the typical discrete bill of material.

In addition, variations in intermediate results and material flow are much greater in process than in discrete manufacturing. Some raw materials used in a recipe may be lost through evaporation, spillage, and the like. Process industry manufacturing personnel often must make adjustments in quantities, ingredients, and production steps as the result of unanticipated outcomes. In many companies, managing actual production variances is considered an art and frequently represents the key to ensuring manufacturing efficiency and profitability.

A recipe has three forms:

- **Standard Recipe:** The standard recipe defines the basic formula or listing of ingredients for an item and includes raw materials, quantity or volume of those ingredients, the routing the product follows through the plant, and the standard or anticipated costs of production. Most manufacturers freeze the standard recipe for some period of time, such as a year, a quarter, or a month.

- **Adjusted Recipe—as planned:** When production is planned using the exploded recipe, the production manager makes on-the-fly adjustments to the recipe, such as increasing the amount of raw materials required, changing the raw material itself, or selecting alternate routings. Generally changes such as these are made because the production manager has evaluated the production environment, condition of on-hand materials and equipment, and similar information not available to the system. From this information the production manager determines which variations must be made to achieve the desired result. At this point the production order has not been released to the floor, so these one-time changes are made to process and recipe details included in the production order itself. An example of this sort of decision is increasing the amount of flour in a recipe for a batch of bread based on the relative humidity of the plant.

- **Adjusted Recipe—as produced:** The adjusted recipe–as produced describes the actual combination of ingredients used in production. It differs from the standard recipe and bill of material, and from the adjusted recipe–as planned, because of any additional unplanned events that may have occurred such as:

    - Using non-standard amounts of raw materials
    - Completing more product than planned (due to a better-than-expected yield or a larger-than-needed shrinkage factor)
    - Consuming more or less time at a work center or in the overall schedule than anticipated
    - Obtaining unexpected co-products and/or by-products that, in turn, can be considered raw materials or finished goods
    - Changes in production factors such as degrading machine tolerances or environmental changes

Using the example from above, the production manager adjusted the amount of flour in the bread recipe at the time the order was planned and released. When the operator actually begins to mix the dough, the relative humidity has changed again and a different amount of flour must be used. Process Industries for Microsoft Dynamics AX provides a flexible approach to formula and recipe management. Not only can Process Industries for Microsoft Dynamics AX manage multiple variations of a recipe, the system can also

maintain and employ alternate recipe attributes, such as whether ingredients are defined as a percentage of the recipe size or as a fixed quantity.

Raw Materials Management

Process Industries for Microsoft Dynamics AX provides a flexible approach to handling raw materials, including:

- Managing and tracking co-products and by-products.
- Analyzing the costs associated with co-products and by-products.
- Managing multiple containers and packaging variations of a main item, including two-level recipes and catch weights for package variations from a single main item.

Co-Products and By-Products

Production processes can yield materials other than the planned end item. These additional outputs, called co-products or by-products, may be reused, sold at a profit, or disposed of at a cost. Co-products and by-products are symptoms of the volatility that can occur while manufacturing process items. Generally, co-products are desirable secondary outputs from the manufacture of the planned product which can be sold or reused profitably. By-products are unavoidable secondary outputs that may be sellable or usable, or they may be waste that must be disposed of at a cost. Occasionally by-products can be sold for a profit, but this is the exception rather than the rule. Process Industries for Microsoft Dynamics AX enables manufacturers to efficiently manage, track, and account for the costs of multiple outputs from a single production run, as shown below.

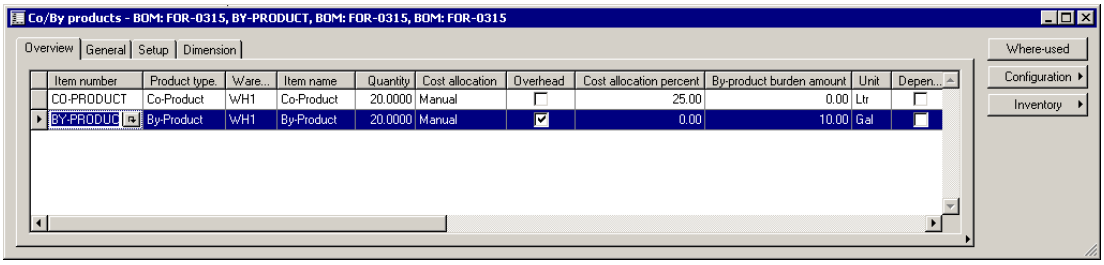


Figure 1. Process Industries for Microsoft Dynamics AX can help you plan and manage multiple co-products and by-products resulting from the same item or process.

Costing for Co-Products and By-Products

While each process manufacturing company handles the costing of co-products and by-products in a slightly different way, the process generally focuses on three best practices:

- No cost
- A manual, hard-allocated cost
- A pro rata cost based on a percentage of the weight of the total recipe

Costing for co-products and by-products can be determined by the percentage of the total cost of the recipe allocated to them. If producing a by-product results in a material that can be used or sold, the cost allocation is positive. However, if the manufacturer has to pay to dispose of the by-product, the cost allocation will be negative. For example, the main item might cost 10 percent more to produce because of

the cost of disposing of a by-product. As a result, the main item carries 110 percent of the cost. A negative value would be applied as a burdened cost on the remainder of the items in the recipe, based upon percentage.

Co-products always result in a positive cost allocation. Consequently, a co-product can assume part of the recipe costs. For example, if a co-product weighs 10 percent of the total production output, then the main item costs 10 percent less, or carries only 90 percent of the cost. To make this allocation, a user must select a pro rata cost-allocation option instead of the no-cost option when creating the recipe for the product.

A recurrent co-product or by-product is both a raw material in the formula and a result of production. For example, if 10 percent of a raw material does not dissolve when it is mixed with other ingredients, this quantity can be recovered at a later stage in production and received back into inventory as a co-product to be reused in a subsequent production run.

Multiple Containers, Packaging, and Variations of a Main Item

Process manufacturers generally handle packaging in one of two ways:

- **As end items of a main item:** In most cases, an end item is a main item that is produced and stored in multiple containers or variations.
- **As separate stock-keeping units (SKUs) packaged with a specified unit amount:** End item functionality manages the situation where each case or container has a different actual weight compared with its theoretical or standard weight.

Defining different item codes and recipes for each of the various end items is not necessary because each end item derives from the same main item, follows the same recipe, and probably results from the same production run. In a discrete manufacturing system the only alternative in such a situation is to assign every container/variation combination a unique finished-goods SKU and, in turn, create a separate bill of material for each combination.

Process industries manufacturers consider these end items as products produced in different containers (such as 10-lb. versus 20-lb.), different packaging types (such as private label packaging), or simply as variations of the main item (such as various widths). Using the enhanced configuration capability of Process Industries for Microsoft Dynamics AX, the user can capture multiple variations for a main item without creating unique item codes and recipes for each.

When an item is defined in this way, Process Industries for Microsoft Dynamics AX displays the total inventory balance by the base unit of measure (UOM) and the breakdown by container type at the same time, on the same screen.

This view enables a salesperson to accurately assess inventory levels and quickly suggest substitute products when the exact type requested by the customer is not available.

Catch Weight

With Process Industries for Microsoft Dynamics AX, a number of weight values are defined on the item master, including normal minimum weight, absolute minimum weight, normal maximum weight, and absolute maximum weight. Process manufacturers must capture the exact weight for packaged products, because the packaged weight often varies from the standard or anticipated weight. Catch weight represents the actual weight of a product in a container, as opposed to the anticipated or theoretical weight of a container or item.

Process Industries for Microsoft Dynamics AX provides a conversion factor for calculating the difference between the weight of the product's base inventory unit and that of the packaging configuration. Still, the actual weight of each case must be recorded accurately in order to evaluate pricing, generate invoicing, determine inventory valuation, and generate reporting.

With Process Industries for Microsoft Dynamics AX, the warehouse staff scans or enters the actual weight of each case, skid, or batch when inventory is picked, packed, and shipped. The total actual weight—the catch weight—is updated for the order, and the customer is invoiced for the actual quantity shipped. Process Industries for Microsoft Dynamics AX also maintains an additional unit identifying the pack quantity for catch weight items. This permits more accurate finished-goods management and enables manufacturers to cost and sell by container/variation combination for each main item.

Two-Level Recipes

After a user defines a recipe that can be produced and stored in multiple variations—a two-level recipe—Process Industries for Microsoft Dynamics AX automatically populates the list of raw materials specified whenever a particular packaging configuration is produced.

Each time a main item is produced and a corresponding packaging type is selected, Process Industries for Microsoft Dynamics AX designates the appropriate amounts of raw materials for that packaging type, without having to create multiple item numbers or recipes for each main item/end item combination. In addition, multiple packaging types can be produced at the end of a single production run.

Lot Management

Many process manufacturers need extensive lot management capabilities. Lot management functionality in Process Industries for Microsoft Dynamics AX goes well beyond simple lot tracking. For example, process manufacturers must be able to track materials:

- From a specific supplier
- As intermediate and finished goods
- When created during production
- As sold to specific customers

Production Date Tracking

For accurate reporting and tracking, Process Industries for Microsoft Dynamics AX captures the production date, as well as the lot number, of raw materials received from a specific vendor.

Using the production date of each raw material or finished good, the system calculates the shelf life of the given lot. Process Industries for Microsoft Dynamics AX can also manage shelf advice date (for example, "best before" date), and the retest date for every lot of a particular product. (Often a product must be retested on a regular basis to ensure the quality of the product is still acceptable.)

Production date and shelf life are used to determine which lots to pick, employing either first in/first out (FIFO) or first expired/first out (FEFO) rules.

Lot Picking Options

In process manufacturing, different lots of the same product can have different chemical attributes. Consequently, when a customer reorders a given item for the same use, the product from the original lot must be sold or used in production to ensure the identical result. Process Industries for Microsoft Dynamics AX enables the user to specify whether the material or product may come from any lot, must come from a full lot, or must come from the same lot that was shipped to the customer on the last order. As a result, the customers can request a specific lot to match specifications and parameters used in previous orders.

Although most manufacturers provide their customers with specifications for standard products, some customers order products with more precise requirements or formulas that differ slightly from the standard formula or recipe. To fulfill these orders, the manufacturer either must produce a special lot that meets the customer's request exactly or find a lot already in inventory that meets those requirements. If a lot meeting the customer's needs is already in inventory, locating and pulling it to fulfill the customer order usually is quicker and more cost-effective than producing a special lot. Process Industries for Microsoft Dynamics AX helps the manufacturer maintain exact lot location information and accurate specifications by lot, making it easy to quickly determine if a lot meeting the customer's requested specifications is in stock or whether one must be planned and produced.

Shelf Life Management

Process manufacturers manage shelf life and the selection of products for sale or use in several ways:

- FIFO
- FEFO
- Best Before ("best if used before the given date")

With Process Industries for Microsoft Dynamics AX, manufacturers can choose a picking option and link that option to the quality control (QC) system for each product. By using this capability, those lots that have been tested and those requiring retesting because they have been on the inventory floor too long can be quickly identified. Managing material shelf life helps ensure that products used or shipped still conform to specifications and have not changed or degraded over time or from exposure to air, moisture, or other environmental factors.

Lot Disposition and Status with Quarantine Management

With Process Industries for Microsoft Dynamics AX, the user can specify one of two main inventory dispositions—available or unavailable—for a given lot, and then define multiple statuses per disposition.

A product is considered unavailable in Process Industries for Microsoft Dynamics AX after the lot has been moved to a quarantine area or designated as quarantined. Users can define multiple quarantine areas within a warehouse, such as separate testing or damaged goods locations. After a lot has been quarantined and flagged as unavailable, the user can record multiple reasons why the particular lot was quarantined.

Reasons include:

- QC hold
- QC failed
- Returned
- Damaged

Tracking lot status provides manufacturers with information about why a product is unavailable and supports correct disposition decisions based on whether the lot is simply waiting for testing to be finished or has been tested and failed.

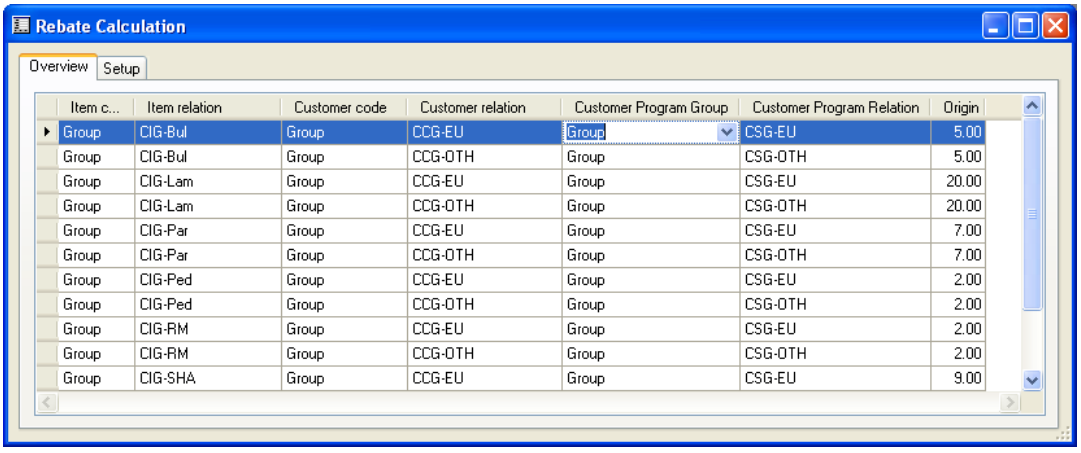
Multi-Dimensional Inventory Views

Process Industries for Microsoft Dynamics AX also enables manufacturers to define and monitor their inventory in various dimensions. While systems intended to manage discrete manufacturing data provide one or two inventory categories, Process Industries for Microsoft Dynamics AX can capture and track up to five. These dimensions enable items to be grouped into a number of categories based on specific attributes. By assigning multiple identification criteria or descriptive data to a given item and by making specific inventory data easier to track, find, and manage, manufacturers can improve production and significantly enhance customer service.

Rebates and Trade Merchandise Spending

Many process manufacturers, especially those in consumer packaged goods and commodity industries, use rebates and trade spending programs to promote their products. Process Industries for Microsoft Dynamics AX provides users with effective tools to monitor and manage these promotional programs.

Process Industries for Microsoft Dynamics AX calculates rebates in the same way it calculates sales commissions. However, the system credits the amount to the customer rather than to the salesperson. In most cases rebates are cash payments or discounts taken against a customer's invoice. On the other hand, trade merchandise spending programs usually involve an amount of money accrued by a customer to be spent for events and promotional items.



Item c...	Item relation	Customer code	Customer relation	Customer Program Group	Customer Program Relation	Origin
Group	CIG-Bul	Group	CCG-EU	Group	CSG-EU	5.00
Group	CIG-Bul	Group	CCG-OTH	Group	CSG-OTH	5.00
Group	CIG-Lam	Group	CCG-EU	Group	CSG-EU	20.00
Group	CIG-Lam	Group	CCG-OTH	Group	CSG-OTH	20.00
Group	CIG-Par	Group	CCG-EU	Group	CSG-EU	7.00
Group	CIG-Par	Group	CCG-OTH	Group	CSG-OTH	7.00
Group	CIG-Ped	Group	CCG-EU	Group	CSG-EU	2.00
Group	CIG-Ped	Group	CCG-OTH	Group	CSG-OTH	2.00
Group	CIG-RM	Group	CCG-EU	Group	CSG-EU	2.00
Group	CIG-RM	Group	CCG-OTH	Group	CSG-OTH	2.00
Group	CIG-SHA	Group	CCG-EU	Group	CSG-EU	9.00

Figure 2. Process Industries for Microsoft Dynamics AX enables a manufacturer to define specific rebate and trade credit policies for each customer.

Rebates are typically defined by a customer code and item code, and can be calculated in several ways:

- Amount per kilo or pound
- Amount per case
- Percent of sale

Rebates are calculated at invoicing, posted to the general ledger, and accrued. Rebate amounts are not shown on the customer invoice, but the rebate can be paid to the customer in the form of an account credit or a cash payment. Calculation methods used by Process Industries for Microsoft Dynamics AX are:

- Rebates by customer by product
- Rebates by customer group by product
- Rebates by customer by product group
- Rebates by groups of customers by groups of products

Trade and Merchandise Allowances

In addition to rebates, Process Industries for Microsoft Dynamics AX supports trade and merchandise allowances (TMA). Trade and merchandise allowances are defined in the same way as rebates, but TMA amounts are posted to general ledger accounts. TMA amounts are typically defined by product category and may vary by customer or customer chain. For example:

Chain	Product A	Product B	Product C
Store A	3.0%	3.0%	2.0%
Chain C	2.5%	3.0%	1.0%

Customers usually spend TMAs on promotional items offered by the manufacturer. With Process Industries for Microsoft Dynamics AX, multiple rebates or TMA programs can be defined and applied to a single order. However, the system calculates and applies all rebates and TMA amounts individually.

Defining Data for Rebates and TMA Programs

In using rebates and trade merchandising, users can specify several kinds of data, including:

- Rebate type or trade merchandising allowance type.
- Calculation as a percentage of gross sales, percentage of net sales, dollars per case, or dollars per UOM.
- Definition by all, group, and table for customer and item.
- Effective date and expiration date.

Payments and accruals can be calculated at several intervals:

- Monthly
- Quarterly
- Yearly

In most rebate and trade promotion programs, the manufacturer pays different customers in different ways. Some customers will have the rebates or merchandising allowances credited to their accounts, while others will request direct payment.

Reporting and Documentation

Process Industries for Microsoft Dynamics AX provides easy-to-read reports reflecting actual sales amounts (the invoice amount after all discounts, rebates, and trade spending allowances). With this report, managers are able to assess the true margin generated by specific items or programs.

The system also provides a monthly report by customer showing:

- Opening accrual amount
- Additional accruals
- Payments and accounts receivable (A/R) deductions
- Closing balance

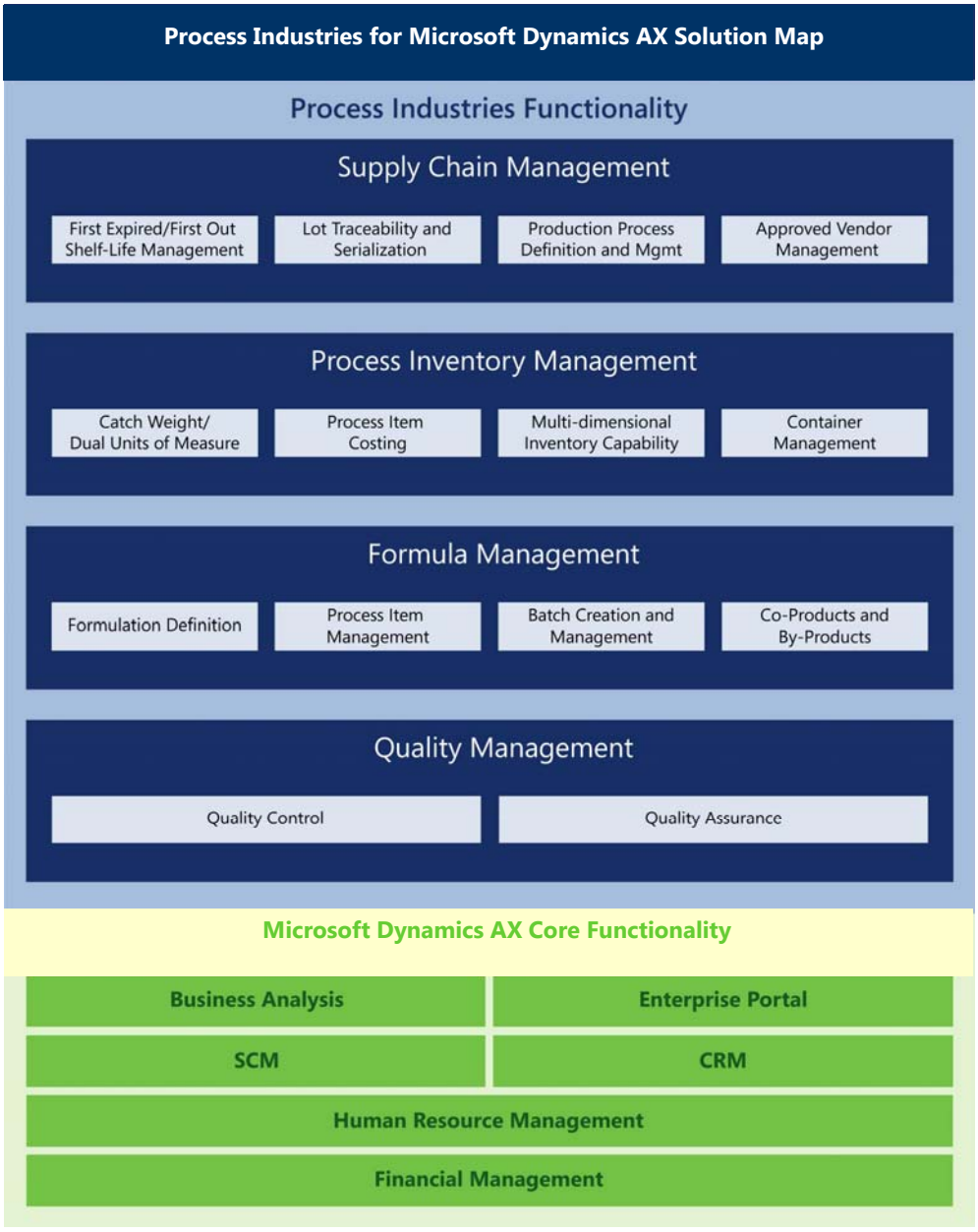
Process Industries for Microsoft Dynamics AX also creates a rebate and TMA statement for each customer. Using this report, the customer and the manufacturer's salesperson can see what credits the customer has earned over a given time for various products and programs, helping to keep salespeople informed and strengthen customer relationships.

An Integrated Business Management System

Process Industries for Microsoft Dynamics AX combines a proven, tested business management solution platform—Microsoft Dynamics AX—with powerful process manufacturing and distribution capabilities. This means that although Process Industries for Microsoft Dynamics AX is designed specifically for process industry companies, it also integrates tightly with core Microsoft Dynamics functionality, providing a complete end-to-end business management system.

Solution Map

Process Industries for Microsoft Dynamics AX provides the industry-specific capabilities manufacturers need to optimize their operations. The following solution map shows the major functionality provided by Process Industries for Microsoft Dynamics AX.



A Flexible, Scalable Platform

Process Industries for Microsoft Dynamics AX has built-in flexibility and scalability to help manufacturers to expand operations or extend their solutions. The layered solution architecture enables businesses to customize one tier without affecting functionality on others. As a result, the potential risk of customization and upgrades is reduced, helping to ensure a long-term solution with a low TCO.

Maximizing IT Investments

With Process Industries for Microsoft Dynamics AX, employees can count on a familiar user experience, one that looks and works like other Microsoft applications and exploits the capabilities of the full range of Microsoft products, including Microsoft Office Word 2003. Close integration with powerful Microsoft technologies such as Microsoft SQL Server™ 2000, Microsoft BizTalk® Server 2004, and Microsoft Internet Information Services 6.0 can help maximize existing IT investments.

Faster Return on Your Investment

Process Industries for Microsoft Dynamics AX can also provide a quick payback on investment. According to a research study by Nucleus Research, Inc. conducted in 2004, 75 percent of participating Microsoft Dynamics AX customers achieved a positive return on investment (ROI) within an average of only 23 months[1]. The remainder had used Microsoft Dynamics AX for periods of less than two years and expected to achieve a payback within a few more months. More than half of respondents reduced staffing costs as a direct result of their Microsoft Dynamics AX deployments, while 44 percent reduced IT costs in moving from their legacy systems. Other positive results cited in the study ranged from more inventory turns and improved delivery times to productivity gains and increases in working capital.

Microsoft Quality Assurance and Support

The reliability, connectivity, and performance of Process Industries for Microsoft Dynamics AX are backed by Microsoft quality assurance and support. To provide high quality and excellent value, Process Industries for Microsoft Dynamics AX has been reviewed by Microsoft's internal development and quality assurance staff and is supported by Microsoft Support Services. A manufacturer can count on the overall assurance of receiving support for its entire solution from one place, rather than having to contact different people and organizations for different support needs. In addition, technical review of the solution prior to launch and throughout the product life cycle helps ensure greater overall quality, performance management, and stability through service packs or major releases.

[1] Nucleus Research, Inc. *The Real ROI from Axapta.* Research Note E116, October 2004.

Conclusion

To remain competitive, process manufacturers must overcome many challenges, including local and global competitors, increasing regulatory requirements, inventory and resource availability and allocation issues, and operational inefficiencies and constraints. Process Industries for Microsoft Dynamics AX provides powerful, flexible tools for process manufacturers to streamline their front-office and back-office operations, maximize the return from their current customer bases, win new customers by becoming an effective competitor, and more quickly react to market shifts and new business opportunities.

Process Industries for Microsoft Dynamics AX can be tailored easily with add-on functionality while still maintaining low total cost of ownership, so manufacturers can adapt and upgrade their solutions over time with less risk and expense. The highly flexible, layered architecture enables Microsoft partners to provide valuable customizations and extensions to the Microsoft Dynamics AX product line to fit unique process manufacturing requirements.

With Process Industries for Microsoft Dynamics AX, manufacturers can invest in their futures by using a solution backed by a vast network of Microsoft Partners and independent software vendors, all dedicated to helping ensure that their Microsoft Dynamics AX solutions change and grow in pace with their businesses.

Microsoft believes that the key to helping businesses be more agile is empowering individual workers with tools that improve efficiency, enable them to focus on the highest-value tasks, maximize the impact of employees and workgroups, and drive deeper connections with customers and partners. Process Industries for Microsoft Dynamics AX can help process manufacturers identify more efficient ways to implement best practices, communicate with their extended supply chains, gain deeper insight into their businesses with real-time information, and more quickly take advantage of new business opportunities.

Features Summary

Feature	Feature Description
21CFR11	Process Industries for Microsoft Dynamics AX enables users to more easily comply with FDA regulations such as 21 CFR Part 11 in the use of their enterprise systems by providing support for electronic signatures as well as complete audit control of the changes made throughout the system.
Actual recipe	The actual recipe captures true raw material, machine usage, and labor consumed during production. While the standard, adjusted, and actual recipes may be the same, most often changes have been made during production and captured through shop floor reporting.
Adjusted recipe	The adjusted recipe is a one-time change made to a standard recipe while the production batch is in planned status. This change enables the production manager to substitute raw materials or specify different direct amounts of ingredients than the standard recipe specifies. Such changes usually are made because of conditions unique to the given batch run.
Assay/Potency concentration	Some items must be tested for the concentration of their contents in order to determine the actual quantity of the product to be consumed or sold. Concentration is the ratio of the quantity of the ingredient being measured to the total volume of the sample. For example, if the potency of a given item is 80 percent, a greater quantity of product will be required to reach the desired inventory levels than would be required if the potency concentration were 100 percent (for example, a bottle of alcohol at 40 percent indicates that it has a greater concentration of alcohol in the bottle than one at 5 percent).
Best Before	The duration (measured as a number of days, months, or years from the production date) used by the system to calculate the date before which a given lot should be used.
By-product	A by-product, like a co-product, is a secondary item resulting from a production run. Unlike a co-product, a by-product is considered by Process Industries for Microsoft Dynamics AX as a product that is not planned or that may be disposed of, potentially at a cost. Regardless of final disposition, by-products are the result of a product run and are tracked as an item when received into inventory.
Campaign scheduling	Ability to schedule similar products together and sequence the schedule in order to minimize setup and changeover

	time.
Catch or nominal weight	Catch weight is the actual weight of an item or a group of items considered together, as opposed to the standard or theoretical weight of a container or item. For example, the theoretical weight of a case of meat is 10 pounds, but the actual or catch weight of the same case at time of production is 9.5 pounds.
Computer-aided formulation	Computer-aided formulation (CAF) provides users with advanced scaling and management of dependencies between raw materials while making changes to an existing recipe.
Continuous manufacturing	Process Industries for Microsoft Dynamics AX can manage and plan production for a discrete manufacturer that is operating an environment without work orders. In this environment, work is planned and managed as a flow or a rate of production rather than as the completion of individual items. Production in continuous manufacturing environments generally is reported by period in either days or shifts based on finished-good production, and backflushing is used to relieve raw materials and components.
Co-product	A co-product is a secondary product that is planned for in addition to the main end item in a production order. In certain industries, such as meat processing, co-products are actually just multiple items that will come out of a production order at the same time (since there is no main end item). Other industries with this outcome include pulp and paper, metals processing, and chemicals. A co-product can either serve as a raw material in the production of another end item or be sold as a finished good.
Freight pricing and costing	Especially in bulk process industries, transportation represents a major component of receiving or shipping inventory costs. Process Industries for Microsoft Dynamics AX tracks costs for receiving or shipping and determines the transportation costs of products.
Item substitution	Process Industries for Microsoft Dynamics AX enables users to substitute equivalent or replacement items for finished goods or raw materials, including "use-up effectivity," while maintaining complete tracking and history.

Lot control	The Lot Control parameter determines if the product will be managed and tracked as part of a specifically identified grouping (a lot). Available options are By Lot (multiple units will make up a lot), By Unit, and Not Applicable.
Materials Data Sheet Safety (MSDS) management	Process Industries for Microsoft Dynamics AX manages the following parameters: Is it the first time a customer has ordered the product? Has there been a change to the recipe since the last time the product was ordered? Has it been three years since the last change to the product? In each scenario, a message to the user will be prompted in order to help ensure that the MSDS sheet is sent to the customer.
Network routing	In manufacturing planning systems, routings have traditionally been sequential (that is, processes follow each other in a linear way). A routing that accurately reflects true process manufacturing sequencing requires a network structure. This structure includes parallel and Y-type operations all within one production order. A network routing will include products being consumed throughout the production process as well as multiple outputs at different operations various.
Percentage recipe	The Percentage Recipe parameter defines how the ingredients or materials of the recipe are defined. If this field is set to Yes, then some materials can be entered as percentages (raw material quantities must equal 100 percent). If the field is set to No, then raw materials can be entered only as absolute quantities.
Quantity non-dependent or constant	This parameter indicates that material requirements are not affected by the size of the production batch. If a batch quantity is changed, Process Industries for Microsoft Dynamics AX adjusts the raw material quantities proportionally.
Rebates and trade spending	Many process manufacturers, especially those in consumer packaged goods and commodity industries, employ rebates and trade spending programs to promote their products. Process Industries for Microsoft Dynamics AX enables manufacturers to define rebates and trade merchandise allowance programs, pay the participants, and account for the results.

Recipe size	Recipe size defines the default quantity of an item to be produced, as specified in the recipe. For example, no less than 500 pounds of an item may be produced in a single batch. Process Industries for Microsoft Dynamics AX enables the user to define production constraints such as maximum batch size. In the above example, if the manufacturing order requires 1,000 pounds be produced, the system will launch two 500-pound orders to fulfill the requirement.
Regulatory reporting	Process Industries for Microsoft Dynamics AX manages various environmental reporting requirements (such as OSHA reporting) and the necessary usage information as dictated by the government.
Rework work orders	A rework work order is a production order for repeating specific production steps to correct or remanufacture an item that has failed quality tests. The item is reworked through the production process to help ensure that it meets quality specifications. A rework order differs from a regular production work order because the raw material and the finished good are the identical item, but additional costs for either the reprocessing or additional raw materials are added to the reworked finished item.
Sales pegging	Process Industries for Microsoft Dynamics AX enables users to link a specific sales order to a specific manufacturing order.
Scalable	The Scalable parameter indicates that if the quantity or amount of a particular raw material is changed, then the system should also adjust the batch size proportionally to the change made to the quantity of the scalable raw material. If the Scalable parameter equals Yes, then Process Industries for Microsoft Dynamics AX will adjust other scalable quantities in the formula. For example, if a scalable raw material is increased by 10 percent, then the batch size will be adjusted accordingly, as will the quantity of all other raw materials that have the scalable flag set to Yes.
Shelf advise	The number of days, months, or years after which a lot should be retested to ensure that it is still good. Process Industries for Microsoft Dynamics AX flags the item and notifies the user that retesting is required.
Shelf life	The period of time a product remains effective, as measured in days, months, or years. Reports and picking strategies are determined based on the shelf life for a particular lot, using first in/first out (FIFO) or first expired/first out (FEFO) rules.

Shrink factor	The Shrink Factor defines the percentage of the raw material that is lost because of evaporation, absorption, and so on. Shortages of raw materials can be prevented in production by assigning a shrinkage factor to a specific item during planning. Based on the shrink factor, Process Industries for Microsoft Dynamics AX will recommend greater material quantities (for example, if the shrink factor is 5 percent, then 5 percent more than the net quantity will be allocated to production).
Specific gravity	The unit of measurement conversion for weight to volume and reverse.
Split lots	In some circumstances, a lot of material or items may be divided into two or more new lots. When a lot is divided, each of the resulting smaller lots inherits or assumes the characteristics of the original lot. That is, the new lots retain the history and relevant qualities of the original lot. For example, in paper and basic metals processing, the manufacturer often produces a master roll that is then slit into sheets or rolls of different widths. Each narrower roll (or lot) inherits the characteristics of the original lot (master roll).
Standard recipe	A standard recipe is defined as the set amount of raw materials, containers, co-products, and by-products to which all actual usage will be compared. Planning and costing engines use the standard recipe, although there may be several one-time changes to a recipe at the production batch level.
Total Quality Management	Process Industries for Microsoft Dynamics AX includes a Total Quality Management (TQM) module that enables a manufacturer to ensure that its operations meet the quality standards defined by the company. TQM includes both Quality Assurance and Quality Control functionality.
Unit of measure (UOM)	Although every item defined in Process Industries for Microsoft Dynamics AX must have a base UOM for inventory valuation, most process items are packaged, stored, and sold using different types of containers and, therefore, different units of measure. For example, bulk materials can be purchased in pounds or gallons and later sold in kilograms or liters. A company's standard UOM—used to value inventory, establish recipe quantities, and so on—must be linked to other units using a conversion factor. In Process Industries for Microsoft Dynamics AX, all UOMs are stored and maintained, rather than calculated each time they are used.

Unit of measure (UOM) types	There are six types of UOMs: weight, length, volume, piece, area, and general. At various stages, a given material may be maintained in different UOMs. When the product changes from one UOM to another, Process Industries for Microsoft Dynamics AX uses a predefined constant, or conversion factor, to translate the actual quantity from one unit of measure to another. For example, to convert from a volume UOM to a weight UOM, the system uses the specific gravity field maintained in the item master record.
Yield percentage	The yield percentage is the ratio of usable output from a process to its input. (For example, if the yield percentage is 95 percent, then usually 5 percent of a batch will be lost to spillage, evaporation, and so on.)

For Additional Information

More Microsoft Dynamics AX information: www.microsoft.com/dynamics/ax.